Lower Extremity Injury Prevention
Building Community Awareness and Safety in Sport

Joann Walker, PT, DPT, SCS, OCS[1]; Caroline Lewis, PT, DPT, SCS, AT[1, 2]; Vince O'Brien, AT[1]

[1]Ohio State Sports Medicine and Rehabilitation, Wexner Medical Center, The Ohio State University
[2]Jameson Crane Sports Medicine Research Institute, The Ohio State University

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Introduction

Anterior cruciate ligament (ACL) injury is one of the most common LE injuries, with an estimated 200,000 ACL injuries diagnosed annually in the United States.[1]

Females suffer knee injuries at a rate of 4-6 times greater than males participating in the same sport.[2.]

Non-modifiable and modifiable risk factors contribute to ACL injury risk.

Modifiable risk factors, such as poor neuromuscular control, can be addressed with a targeted neuromuscular training program.

Purpose & Mission

Purpose: To improve an athlete's neuromuscular control and address strength imbalances when performing high-risk activities involved in sports in order to learn to move correctly through the range of motion necessary for his or her sport or activity

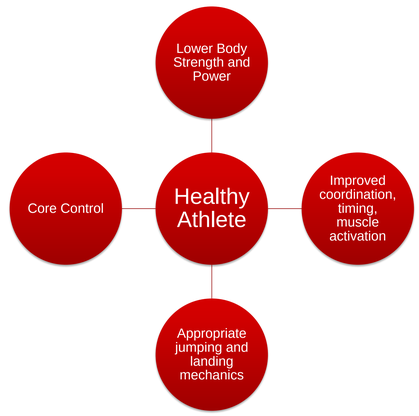
Mission: To improve the lives of individuals at risk for lower extremity injury through individualized evidence-based neuromuscular training and excellence in patient care, research, injury prevention and performance

Modifiable Risk Factors

Underlying Neuromuscular Imbalance	Targeted Neuromuscular Intervention Component
Ligament Dominance *Poor frontal plane control*	Train for proper technique
Quadriceps Dominance *Poor posterior chain activation*	Strengthen posterior chain
Leg Dominance *Poor muscle activation in non-dominant limb*	Train side-to-side symmetry
Trunk Dominance *Impaired trunk/core control*	Core stability and perturbation training

Program Overview

4 phase program with progressive loading tasks, emphasizing strength symmetry and appropriate landing mechanics with increasingly demanding tasks



Lower Body Strength and Power

Medial collapse of the knee and decreased posterior chain activation during sports activity was the most accurate predictor of future ACL injury in a cohort of 205 adolescent females[4]

Single leg bridge with ball hold

Core Control

Decreased core proprioception is associated with increased knee injury risk

BOSU single knee hold

Jumping and Landing Mechanics

Neuromuscular training has been shown to decrease ACL injury risk of female athletes participating in high risk landing/cutting sports by 24-82%

Single leg forward hop

Coordination, Timing and Muscle Activation

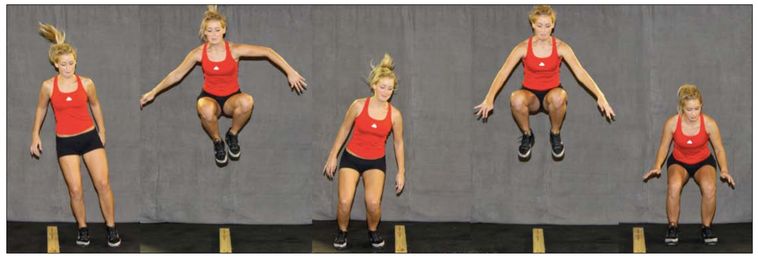
Stabilization of the knee during sport requires coordinated co-activation of adjacent musculature

Lateral BOSU hop with ball toss

Optimal Implementation

Research has demonstrated that implementation of NM training programs may be optimal in early adolescence, before the onset of abnormal movement patterns[5].

Implementing this type of training in 14 to 18 year old athletes participating in cutting and pivoting sports may reduce lower extremity injury risk by 72%[5].



Individualized Medicine

Gold Standard Program
- 4-6 athletes/clinician
- 12 sessions/6 weeks
- Research based

Not all teams will desire to complete the full program

We can individualize training to meet the needs of the program
- 4-6 visit minimum

Contracts negotiated on a client-to-client basis

Community Outreach Goals

The goal of the program is to have a community presence in the greater Columbus area by working with individual athletes, as well as various club, middle and high school programs.

The mission of this outreach program is to prevent LE injuries for the athletes in our own backyard. This presentation will provide an overview to the OSU Lower Extremity Injury Prevention program, as well as highlight the faulty movement patterns being addressed.

References:
1. Borchers J, at al. *Am J Sports Med*, 39(9), 2011.
2. Quatman C, et al. *Am J Sports Med*, 34(5), 2006.
3. Hewett T, et al. *Clin Orthop Relat Res*, 470(10), 2012
4. Hewett T, et al. *Am J Sports Med*, 33(4), 2005.
5. Myer G, et al. *Am J Sports Med*, 41(1), 2013.

Acknowledgements: The Ohio State University Sports Medicine Research Institute Team; Ohio State Sports Medicine Clinical Outcomes Research Coordinator program